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[OFFICIAL NOTICE.]

Eleventh Annual Meeting of the American Gas Light Association.

AMERICAN GAS LIGHT ASSOCIATION,
SECRETARY'S OFFICE, NEW YORK, Aug. 9, 1883.

The Eleventh Annual Meeting of the American Gas Light Association will be held in New York city on the 17th day of October, 1883, at 10 A. M., and continue for three days. The Committee of Arrangements have unanimously decided upon the Westminster Hotel, corner of Sixteenth street and Irving place, as the headquarters of the Association. The location is very central, being but one block east of Union Square, convenient to elevated railroad stations and principal surface car and omnibus routes. The appointments of the hotel are first-class in every respect, and the low rate of $3 per day has been secured—being quite a reduction from the regular rate charged. Members intending to be present at the meeting will please advise either Mr. James R. Floyd, 531 West 20th street, or Mr. Geo. Shepard Page, 49 Wall street, New York city, of the Committee of Arrangements, who will attend to the matter of engaging rooms, etc. It is important that early notice be given, in order that disappointments may be avoided. Gentlemen whose intention it is to be accompanied by their ladies will so advise.

Members are earnestly requested to prepare papers to be read, or to present, in other form, such facts as may be of general benefit which the experiences of management may have given them.

The Association owes to itself the duty of rendering its meetings of interest and practical value, not to its members alone, but also to that growing circle of those outside of its membership who, interested in the same industry, naturally look to this Association for instruction. It is therefore of the utmost importance that evidence of our active participation in, and knowledge of, the changing conditions of our business should mark the proceedings of the Association, if its influence upon the gas industry of the country is to be of permanent value. To this end all must share in the labor incident to the work, and feel an individual interest and responsibility.

The Secretary requests members to notify him, at as early a date as possible, of the topics they may select for papers. All requests and suggestions should be addressed to the Secretary, at 94 Dearborn street, Chicago, to receive prompt attention. WM. HENRY WHITE, Secretary.

THE ELEVENTH ANNUAL MEETING OF THE AMERICAN GAS LIGHT ASSOCIATION.

The Eleventh Annual Meeting of the American Gas Light Association, in accordance with the official notice of the Secretary published above, will be held in the city of New York, commencing on Wednesday, October 17, and continuing for three days. The Association has not held its annual convention in this locality since the fall of 1878, and we look forward to its return to the Metropolis with every expectation that great things will be accomplished at the eleventh annual session.

The one possible drawback to complete success will be the consideration that so many familiar faces will be missed from the fraternal gathering, and that so many tried and trusted ones will fail to respond to the call of the annual muster-roll. It is quite unnecessary here to mention the names of those who have dropped out of the ranks, and it would also be much out of place,

at the present time, for us to anticipate in the slightest degree any action to be taken by the Association in reference to the memories of those who were among the pioneers and most steadfast supporters of the aims and objects for which the Association has its being.

There were never before so many reasons why the American Gas Light Association should be active and alert. The tendency of legislation, in regard to gas matters, becomes every year more and more vicious and oppressive; and this will continue to grow and spread until concerted action for relief be taken. The word vicious is used advisedly; and that it is not misapplied will be readily understood by a reference to one or two of the laws which were proposed to be enacted as part of the statutes of the State of New York during the past terms of its legislative assemblies. By these it was sought to arbitrarily fix a certain rate to be charged for gas, irrespective of the fact as to whether such prices would be fair and just to the parties who were most vitally interested in the matter. We do not suppose that the intention of the great and virtuous statesmen who offered these measures was other than a scheme of blackmailing, pure and simple; and whether or not such blackmailing propositions failed of success does not alter the case of the viciousness of the attempts. If it be needed that the law should interpose between the maker and consumer of gas, let measures be taken to have such legislation properly meet the case in point, so that the outcome will be fair and just to all concerned. These remarks do not apply to the State of New York alone, but will be found just as applicable to every other State and Territory in the Union. Necessity for concerted action being of such paramount importance, what is more reasonable than that these things be considered by the body representing the vested interests of the gas fraternity of the country. The American Gas Light Association and the various district associations have brought about a state of affairs in the industry of the gas maker varying greatly from that ruling before their formation. In former times distrust and secrecy were the features, and now the reverse of these holds good. Everyone is willing to help his neighbor; and surely this is as it ought to be.

The local committee of arrangements have selected the Westminster Hotel, corner of Sixteenth street and Irving place, as headquarters, and are to be felicitated upon their choice. The Hotel is first-class in all its appointments, is excellently situated, and can be easily reached from all the railroad stations of the city. In order that no disappointments may occur, it is hoped that those intending to be present have given due heed to the Secretary's recommendation that notice be given the committee of arrangements to secure rooms, etc. The business sessions of the Association will be held in Teutonia Hall, which building is but a few moment's walk from the place of headquarters. This Hall is admirably adapted for the purpose required, and here again the local committee must come in for renewed congratulation.

Judging from the number of applications for rooms already received by those in charge of the matter, the eleventh annual meeting will be an unprecedentedly large gathering, and the prospects of a very successful session are more than flattering. Several gentlemen have signified their intention of presenting papers on topics of interest, and it is hoped and expected that these intentions will be faithfully carried out.

We are unable at this time of writing to give a detailed programme of the features of the meeting; but the general outline will be about as follows: The morning of the first day, Wednesday, October 17, will witness the preliminary organization, with transaction of routine business and reading of the President's address, followed in the afternoon with presentation of papers and discussion of same. The second and third days will be occupied with business sessions in morning and afternoon, and the carrying out of the programme to be arranged by the local committee, which has not yet been promulgated. A banquet will be tendered the Association by the Manhattan, New York, Harlem, Metropolitan, Mutual, and Municipal Gas Companies of New York city, and an elaborate and complete affair it promises to be.

Every member of the Association should make it a point to be present at the eleventh annual meeting, and we confidently predict that, when the hour for adjournment arrives, those in attendance will agree that they have been well and apply repaid for their journey to New York.

AN EXAMPLE OF HOW OPPOSITION SERVES THE PUBLIC.

Notwithstanding the numberless exposures which have been made concerning the fallacy of the idea that opposition gas companies enter the precincts of a town or city for the purpose of benefiting gas consumers, by permanently reducing the price of the commodity which it is proposed to supply, we find the old familiar plea of cheaper gas constantly brought to the foreground as the convincing reason why opposition companies should be granted the right of official birth. If it could be shown that such promises were ever fulfilled, in any single instance, some slight shadow of excuse might be framed for the gullibility of the American public in this respect; but it would actually seem as though repeated failure to keep the pledges given merely served to stimulate the said American public with the expectation that the latest promisers would be sure to carry out the line of policy which had heretofore never seen the light of practical fulfillment.

The newest picture of the benefits of opposition gas works is pretty cleverly illustrated by the action lately consummated in the matter of the Poughkeepsie (N. Y.) gas war. One of the peculiar features of the Poughkeepsie case is the length of time taken to bring the contending parties to an agreement. Those who were interested at the outset in the matter of furnishing the boon of cheap gas to the people of Poughkeepsie started in with the usual claptrap about what was going to be done. They announced themselves as the possessors of a method whereby the process of gas manufacture was to be revolutionized; foretold the speedy demise of the company which had previously "robbed the unsuspecting public;" and, if they did not give gas away, well, the price at which it was to be sold would be the next thing to it.

The upshot of the whole affair may shortly be summed up in the following manner: After fighting along for a period of about eight years, in which time the price of gas had gravitated between various figures, the last figure having been $1.75 per thousand, with discounts in the cases of those who consumed large quantities—such discounts bringing the lowest price down to $1.50 per thousand—the inevitable came at last. With this state of affairs probably neither company had earned a fair dividend on its capital stock, and the "holy fire" of a desire to benefit the "dear people" having burned itself out, measures looking to a compromise were instituted, with the result noted below.

Hereafter the people of Poughkeepsie will pay $2.25 per thousand for the gas registered as passing through their meters; the additional *concession* being that a discount of 5 per cent. will be allowed in cases of prompt payment, and nothing more. How the new deal will affect the feelings, to say nothing of the pockets, of the consumers who paid $1.50, remains to be seen.

It is understood that a hard-and-fast agreement exists between the former competitors that this price shall remain unaltered for a term of five years; and here ends the second chapter of the Poughkeepsie gas war. The price paid by the city authorities for the lighting of street lamps is not changed—each post being charged for at the rate of $34 per annum. This amount includes lighting, extinguishing, cleaning, and maintaining.

The Exhibit of the Consumers Gas Company at the Toronto Exhibition.

The exhibit made by the Consumers Gas Light Company at the Toronto (Can.) Industrial Exhibition, as outlined in our "Item" columns of the issue of September 3d, was carried out to the letter, and Mr. Pearson feels greatly elated over the triumph which has attended his efforts in bringing to a successful termination the first complete public exhibit of gas appliances held in this country. The Judges awarded a medal of the first class to the exhibitors. A descriptive account of the display came to hand too late for publication in this number.

American Institute of Mining Engineers.

T. M. Drown, Secretary of the American Institute of Mining Engineers, has announced the programme for the Fall meeting, to be held at Troy, New York, on Tuesday, October 9, and continuing for four days. On the 9th the opening session will be called at Keenan Hall, at 8 o clock P. M. Wednesday, the 10th, will be occupied in visiting various points of interest in Troy and vicinity; in the evening a session will be held in Keenan Hall for the reading and discussion of papers. On Thursday business meetings will occupy the time of the Institute from 10:30 A. M. to 3 P. M.; and in the evening a subscription dinner will take place at the Troy House, at which ladies, as usual, are expected. On Friday a special train will be provided to take the members to the Hudson River ore property, at Burden Station, as guests of the Hudson River Ore Company. After inspection of the mines and roasting kilns, lunch will be provided by the company, and the party will then return to Hudson, where those going South can take the regular afternoon train, those going North remaining on the special train for Albany and Troy.

Hotel accommodations will be found at the Troy House ($3.00 per day); American House ($2.50 per day); and the Mansion House ($2.00 per day). The Troy House will be the headquarters of the Institute during the meeting, but it is not expected that all the members, and ladies accompanying them, can be accommodated there. No reduced railroad rates have been obtained for the meeting. It is desired that members should notify the Secretary of the Local Committee of their intention to be present at the meeting, and state whether ladies will accompany them.

On the Antiseptic Alkaloids Contained in Creosote Oils.

By Greville Williams, F.R.S.

[Mr. Greville Williams, F.R.S., has been experimenting, at the laboratory of the London (England) Gas Light Company, on the above subject, and he gives the following as the result of his researches. The rapid destruction of our American forests must of necessity call attention to the employment of artificial means for prolonging the life of timber—and in the attainment of this end the residual products of the gas manufacturer are destined to play a prominent part. An account of these experiments appeared some time back in the *Journal of Gas Lighting*, the same having since been published by the author in pamphlet form.—Ed.]

There is no doubt that an opinion prevails among those who are most interested in the question, that the preserving power which the so-called creosote oils exercise on timber is chiefly due to the phenol (carbolic acid) which they contain. Were this not so, it is evident that so much care would not be taken, when drawing up specifications, to define the minimum percentage of phenol and its homologues which must be present. (See Lunge's "Distillation of Coal Tar," p. 205.) I presume, however, that most chemists admit that creosote oils would, by excluding moisture and affording an environment incapable of supporting the lower forms of life, have a considerable protecting power even if no phenol were present. It is obvious that wood thoroughly saturated with a substance whose properties were chiefly negative, would, as long as that substance remained, be sterile. This will be plain if we imagine a piece of wood completely impregnated with melted paraffin. As long, therefore, as wood contains a sufficient amount of solid or liquid hydrocarbons, even if no phenol be present, it will remain sterile. The protecting power of creosote oils is really a function of the hydrocarbons and the antiseptics; and one of the objects of this paper is to show that phenol and its homologues are not the only antiseptics present in them.

My attention having been drawn by Mr. S. B. Boulton (of the well-known firm of Burt, Boulton, and Haywood) to the fact that in old railway sleepers phenol was not to be detected by the ordinary tests, I determined to investigate the subject, and requested him to let me have some creosoted timbers of various ages. In response, he was good enough to send me the fifteen specimens which form the subject of the following experiments:

Process for the Examination of the Woods.—After some preliminary trials, the following methods were finally adopted for examination of the specimens. A slice about 1½ inches thick was sawn out of the wood in such a manner that the creosoted and uncreosoted portions were exposed to view. A cube was then cut out of each, to enable the specific gravity to be taken. From another portion of the creosoted part of the wood, 1,000 grains were cut into thin splinters and distilled with water. This brought over the oil, naphthaline, and phenol. When the phenol could not be detected in the distillate, a second experiment was made, and the distillate fractionated. The phenol was then tested for in the first fractions. The ordinary methods having generally failed, I availed myself of the bromine and ammonia test employed by Cloetta and Schaer to detect phenol in urine. ("*Zeitschrift fur Analytische Chemie*," Vol. XXI., Part 1, 1882.) For this purpose ammonia of the specific gravity 0.880 was diluted ten times. A solution of pure phenol containing one part in 3,000 was also prepared for purposes of comparison. The distillate from the woods was passed through wet filters until free from turbidity. Equal portions of the standard solution of phenol and the distillate were then placed in small beakers standing on white paper. To each was added 5 cubic centimètres of the dilute ammonia; and then fresh bromine water drop by drop, and very slowly. The presence of phenol was indicated by a fine blue tint forming, which is very permanent.

Soon after commencing these experiments it struck me as desirable to ascertain if the volatile bases of alkaloids contained in all creosote oils remained in the woods. The matter seemed to me the more important, as, from the result of many years devoted to their investigation, I believed that their presence would sterilize any organic fluids or tissues otherwise well suited for the development of living germs. With this view, 1,000 grains of the wood (in splinters) were distilled with water slightly acidulated with sulphuric acid. The distillate was sometimes tested for phenol, especially in cases where the distillate from the wood with water alone had failed to yield the blue reaction, or had only done so feebly. When oil ceased to come over, the residual fluid in the retort was filtered; then treated with potassium hydrate until alkaline; and finally distilled. The distillate had invariably the powerful odor of the volatile bases; was generally milky; and often contained small globules of oil. The addition of a few drops of hydrochloric acid, as a rule, instantly rendered the solution clear; though in some experiments traces of an insoluble oil remained undissolved. When this was the case the solution was passed through a wet filter until it was free from cloudiness. The hydrochloric solution was evaporated on the water-bath to a very small bulk; a strong solution of platinic chloride was added; and the whole set aside for twelve hours. At the end of this time a certain amount of platinum salt was always obtained, which was thoroughly washed with a mixture of alcohol and ether. It is to be understood that, in each distillation, the vapors from the retort were passed through a glass tube, 3 feet long, which entered a globular receiver; both being kept cold by a stream of water. This is a most effectual method of eliminating traces even of naphthaline from mixtures; naphthaline being carried forward with extreme readiness by a current of steam. The oil and naphthaline were not quantitatively estimated, as the mere recognition of their presence was all that was necessary.

Specimen, A.; *age* 16 *years.*—Specific gravity of the uncreosoted portion, 0.5176; of the creosoted, 0.6717. Some naphthaline, and much oil were obtained; also a distinct trace of phenol. The platinum salt (which fused in the water oven) weighed 1 grain.

Specimen B.; age 17 *years.*—Specific gravity of the uncreosoted portion, 0.4876; of the creosoted, 0.6094. A very small quantity of naphthaline, and a moderate amount of oil were obtained; but only a faint trace of phenol. The platinum salt weighed 0.63 grain.

Specimen C.; age 20 *years.*—Specific gravity of the uncreosoted portion, 0.4995; of the creosoted, 0.6208. The phenol was very distinctly observed in the distillate obtained with water alone; and it was as nearly as possible of the same depth as in the solution of phenol containing 1-3000th part. Much naphthaline and oil came over.

Specimen D.; age 20 *years.*—Specific gravity of the uncreosoted portion, 0.5106; of creosoted portion, 0.6537. This specimen, on distillation with water, yielded much naphthaline and oil; but no blue reaction with bromine and ammonia. Another portion was acidulated before distillation, and the distillate submitted to fractionation. The first fraction of the distillate so obtained gave a distinct trace of phenol. The organic bases gave a partly crystalline and partly an adhesive platinum salt.

Specimen E.; age 22 *years.*—Specific gravity of the uncreosoted portion, 0.6286; of the creosoted, 0.6908. Much oil and naphthaline were present. The phenol reaction was feeble in the distillate with water alone; but, on distillation after acidification, it was powerful. The bases were present in sufficient quantity to come over in oily drops; and afforded 5.08 grains of a deep orange colored platinum salt. On iguition it gavc 27.11 per cent. of platinum. This agrees very closely with the theoretical number for cryptidine, which requires 27.24. This base, which has the formula $C^{11}H^{11}N$, was discovered by me in creosote oils many years ago. (Transactions of the Royal Society of Edinburgh, Vol. XX1., Part 3.) It is the third homologue of the leukoline (now generally called the quinoline) series.

Specimen F.; age 22 *years.*—Specific gravity of the uncreosoted portion, 0.4447; of the creosoted, 0.5294. Much naphthaline and oil came over, but no phenol. It afforded 0.94 grain of a rather dull yellow platinum salt.

Specimen G.; age about 25 *years.*—This specimen is known to have been creosoted with London oil; it had been part of the fence of the Victoria Docks. There was no portion of the wood sent to me which had not been reached by the oil. Its specific gravity was 0.4905. It yielded much naphthaline and oil; and gave a strong and brilliant reaction of the phenol. The platinum salt weighed 2.86 grains, and was bright yellow and crystalline.

Specimen H.; age 28 *years.*—The specific gravity was not taken, as in the wood at my disposal the creosote oil had not completely penetrated. A moderate amount of naphthaline, and a large quantity of oil were obtained. The phenol reaction was distinct, but rather weak. The organic alkaloids yielded 0.85 grain of a dull yellow platinum salt.

Specimen I.; age 29 *years.*—Specific gravity of the uncreosoted portion, 0.6329; of the creosoted, 0.8686. On being distilled with water, and the distillate fractionated, a distinct reaction of phenol was obtained. The wood also contained much oil and naphthaline. It gave 0.82 grain of a brownish yellow platinum salt.

Specimen K.; age 29 *years.*—Specific gravity of the uncreosoted portion, 0.4305; of the creosoted, 0.5232. When distilled with water alone, the phenol reaction was obtained; but only faintly. A moderate amount of oil was found, but no naphthaline. On treatment with acid, followed by fractionation of the distillate, the phenol reaction was obtained strongly. The volatile alkaloids came over in oily drops, and yielded 2.24 grains of a pale yellow platinum salt. In this specimen the creosoted portion of the wood was paler in color than usual, and slightly softened.

Specimen L.; age 30 *years.*—The specific gravity of the uncreosoted part could not be taken, as it consisted almost entirely of knots; that of the creosoted portion was 0.6426. Distilled with water, and the distillate fractionated, a distinct reaction of phenol was obtained. After acid treatment, the wood yielded 1.40 grains of an orange colored platinum salt. The oil in this specimen was small in quantity, and no naphthaline was found. It is important to observe that the alkaloid or alkaloids remained after most of the oil and all of the naphthaline had disappeared.

Specimen M.; age 32 *years.*—The specific gravity of the uncreosoted portion was as low as 0.3900, and the wood was softened. The creosoted part had a density of 0.5040. Much oil came over, which, on cooling solidified

with naphthaline. The phenol reaction was very distinct. A bright yellow platinum salt was obtained, weighing 1.52 grains.

Specimen N.; (from the Taff Vale Railway Company); age doubtful.—The specific gravity of the uncreosoted portion was 0.4893; of the creosoted part, 0.5795. The naphthaline and oil were small in quantity, and no reaction of phenol could be obtained. The quantity of platinum salt was very small, and it fused on drying in the water oven.

Specimen O.; (from the London, Chatham, and Dover Railway Company); age doubtful.—Specific gravity of uncreosoted portion, 0.4460; of the creosoted part, 0.6097. It yielded much naphthaline, and a moderate amount of oil. Distinct traces of phenol were obtained; and 0.33 grain of a yellow platinum salt.

Specimen P.; newly creosoted.—Specific gravity of the uncreosoted portion, 0.6284; of the creosoted part, 0.8495. It yielded a very large quantity of naphthaline and oil. The latter solidified from the presence of excess of naphthaline. The distillate gave powerful reaction of phenol, and no less than 16 grains of a bright yellow platinum salt. This is equivalent to about 0.5 per cent. of alkaloid in the wood. The salt on ignition yielded 27.36 per cent. of platinum, which (like that from specimen E) agrees closely with the theoretical number for cryptidine. The quantities of platinum salts from the woods were generally too small to allow of a reliable analysis being made; and, where the platinum could be determined, the numbers sometimes indicated, as might be expected, the presence of members of the pyridine series.

On the Antiseptic Properties of the Organic Alkaloids contained in Creosote Oils.—The yolk and albumen of a new-laid egg were thoroughly mixed, diluted to 4,000 grains, divided into four portions of 1,000 grains each, and placed in glass beakers covered with glass plates. To No. 1 was added 1 grain of the mixed alkaloids from London creosote oils; to No. 2, 10 grains of the same; to No. 3, 1 grain of pure phenol; and to No. 4 nothing was added. The four beakers were then put aside in a place where the temperature ranged from 60° to 63° Fahr. In two days No. 4 (the diluted egg, with no alkaloids or phenol added) became slightly offensive in odor. In seven days No. 1, containing a thousandth part of the alkaloids, was slightly offensive; No. 2, with 1 per cent. of bases, was unaltered; No. 3, with a thousandth part of phenol, was more offensive than No. 1 with the same amount of alkaloids; and No. 4 (unprotected) was so offensive that it was thrown away. In nine days, No. 1 was slightly but distinctly putrescent; No. 2, unaltered; and No. 3 was so offensive that it was thrown away. In this experiment, therefore, the one-thousandth part of the mixed bases was more powerful as an antiseptic than the same amount of phenol. The experiment from this time, therefore, was only continued with No. 2, which remained without any putrefactive odor until January 2, 1883—a period of three months—when the experiment was stopped.

In a parallel experiment to the above—with 1 per cent. of phenol, and the same quantity of the alkaloids—both remained without any signs of putrefaction from October 12, 1882, to January 16, 1883. In a third trial exactly the same result was obtained.

These results distinctly prove that for a period of three months the mixed alkaloids are at least as powerful antiseptics as phenol; and, as it would be interesting to know how much longer they remain effective, I propose at the first opportunity to make further experiments.

The Amount of Mixed Alkaloids contained in Creosote Oils.—In an examination of one specimen of London creosote oil for the amount of alkaloids contained in it, I found 2.04 per cent. of the anhydrous bases of the pyridine and quinoline series. The quantity, however, probably varies in different specimens. (It may be remarked, for the guidance of other experimenters, that the test of dryness consists in the bases being absolutely unaffected by long digestion with sticks of fused potassium hydrate.)

Summary.—From the above experiments, it will be seen that the creosoted portion of the wood—even after a lapse of 32 years—is invariably denser than the uncreosoted part. It is also demonstrated that, not only are organic bases equally powerful as antiseptics with phenol, but that they remain in the wood, in quantities capable of estimation, after the phenol has disappeared. One reason for this is that they are oxidized with difficulty; in fact, cryptidine may be dissolved in nitric acid and evaporated to dryness without being destroyed. This was one of the methods which, at the time of its discovery, I adopted for its purification.

It is evident, from what has been said, that we must now modify our views regarding the antiseptic properties of the creosote oils. In addition to the preservative powers of the hydrocarbons, regarded merely as a sterilizing environment, we must now consider the antiseptic character of the creosote oils as due to the presence not only of phenol, but also of the bases; and, the latter remaining even after the phenol has disappeared, as due more to the bases than to the phenol.

The results of experiments on the physiological action of these bases, impress me strongly with the belief that, properly applied, they would render timber absolutely invulnerable to the ravages of the *Teredo Navalis*.

The Testing of Bricks,

The *Builder* notes that the brickmaking industry has of late been making special efforts to meet the requirements of modern building, and the exact definition of what those requirements are is evidently an important point in such a matter. The introduction upon an augmented scale of machinery into the process of brickmaking, and the employment of various new materials, render difficult the definite appreciation of the qualities of bricks. As in these busy times no one would like to wait long enough to arrive by actual experience at the results in question, a reliable method of determining the quality and durability of bricks would naturally be of advantage to the building industry.

It has been attempted to draw conclusions of this kind from an examination of the raw material used, and of the process of manufacture; but the considerable differences between the various systems in use would seem to indicate that a way of arriving at the wished-for result without reference to the method of production would be the most acceptable to all concerned. Such a test must be carried out with special reference to the purposes for which the bricks would be employed, and the following classification is given by Herr Rühne in the *Deutsche Bauzeitung*, as comprising the various uses to which bricks are put:

1. *Facing Bricks.*—Frist-class for monumental buildings; second-class for dwelling-houses, etc.; third-class for buildings along rivers, etc.; fourth-class for factories, etc.

2. *Bricks which bear Weight.*—Classified according to heavy, medium, and light burdens.

3. *Roofing Tiles.*—For special requirements and for ordinary uses.

4. *Paving Tiles.*—For use in the open air, and in the interior of buildings.

With respect to these various modes of employment it would be necessary to establish minimum requirements, and it is remarked that the definition of them and the drawing-up of rules founded on these investigations are matters in which technical authorities as to building and brickmaking would require to take joint action.

The points for elucidation are as follows:

1. For what requirements are the bricks to be tested? 2. What mode of testing should be adopted? 3. How are the results obtained to be utilized? There would, as to the first point, be a more or less elevated degree of resistance to pressure to be fixed with respect to each description. In addition to this it would be necessary to establish a test for the resistance of bricks to frost and other influences of the weather. Their resistance against internal saline crystallization would also have to be considered, and, finally, it would be necessary to establish a rule that bricks should be free from soluble salts, or should, at the very most, only contain a small fixed proportion of them. For many articles a test of porosity would be necessary, and one with regard to weight would have to be carried out in all cases. The methods now in use of determining resistance to pressure and of arriving at the degree of porosity which bricks possess, seem to call, according to Herr Rühne's opinion, for no special alteration, but the mode in which the recognized analytic establishment at Berlin carries out tests for resistance to frost does not meet his approval. It consists in placing the bricks in water, which is gradually heated up to boiling point, when they are cooled by being suddenly thrown into cold water. In place of this method he recommends the production of a low temperature by the usual process employed in ice manufacture. This is arrived at without much expense, and the natural action of frost is said to be reproduced in this way much more closely than by any alternative methods. It is suggested that after the freezing test the resistance to pressure should again be tried in order to find to what extent the low temperature had really affected the strength of the bricks. After a certain number of experiments of this description have been carried out the results obtained would indicate with approximate exactness the loss in resisting power resulting from the repeated application of the freezing process, and thus there would be a definite basis on which to frame rules. Rainwater, air, light, carbonic acid, ozone, and other natural influences may also be considered as affecting the condition of bricks, but their effects are practically of so limited a character that tests with respect to them are not considered necessary.

Special importance is, however, attached to the discovery of the presence in bricks of those soluble salts the appearance of which, in the form of a white exudation, is a source of annoyance, which, under some circumstances, can more or less seriously affect the question of durability. As the complete absence of these salts is hardly to be looked for, a certain number of experiments would define a limit which should not be exceeded. This limit would necessarily be fixed after a due consideration of the relative effects of different salts in various quantitative proportions. The question of saline crystallization is, however, less easily treated, as in this instance the active cause does not only form an integral part of the brick, but may to some extent, be composed of salts which are introduced while the brick is in position. This condition is usually found in connection with embankments, sewers, etc., in

which cases the brickwork is exposed to various influences especially calculated to produce the effects in question. Herr Rühne considers that a particular test in connection with saline crystallization can hardly be established at present, and remarks that in any case its effects would be less forcible than those of frost.

As to the application of these tests, it is maintained that, to be of practical value, they should be applied to samples impartially drawn from the bricks actually to be employed, as the fact that on one occasion a brick-manufacturer delivers a good quality is no assurance that he always does so, inasmuch as any change in the materials used, or in the process of manufacture, would naturally affect the bricks. It is argued that the adoption of these tests would be an advantage to all concerned, even if the price of bricks were thereby to be increased, as the improvement in quality would fully compensate for any such augmentation. Besides, the cost of production would only have to be raised in direct proportion to the percentage of bricks which would fail to correspond with the requirements of the accepted standards.

Comparative Cost of Cooking by Coal and by Gas.

By Norton H. Humphreys, F.C.S.

In a communication to the London *Journal*, entitled "Some Notes in Regard to the Smoke Abatement Institution Tests," the author, in dealing with that portion of his subject relating to the comparative cost of cooking by coal and by gas, calls attention to a fact that has scarcely received the attention it deserves, in connection with the use of coal gas for cooking, which is that *gas is cheaper than coal.* Taking the best forms respectively of coal-using ranges on the one hand, and gas cooking apparatus on the other, and the fuel, the gas and the coal, respectively at the present prices current in our towns, it is a fact that there are few circumstances in which gas will not come off the victor in point of economy. It is open for consideration whether it would not be best to make this the chief argument in recommending the use of gas cooking stoves to consumers; leaving as subsidiary matters the cleanliness, greater efficiency, saving of trouble, etc., which cannot fail to tell their own tale, and be duly appreciated in practice. It seems to me (though, of course, this is a matter of personal opinion only) that the cleanliness and efficiency of gas stoves have been somewhat over-pushed upon the public; and this for two reasons. The first is that the public are naturally rather suspicious of gas companies, and inclined to attribute all their endeavors to introduce the use of gas for cooking, heating, etc., to the ultimate desire for an increased use of gas; in which, no doubt, they are to a certain extent correct. However, taking in this spirit the statements as to the advantages of gas stoves, a speech (or, let us say, a pamphlet of a few pages) consisting chiefly of statements about the freedom from dust and cinders, from heat in the kitchen, of saving in domestic labor, etc., with only a brief reference, and then in general terms, to the *cheapness* of gas, will appear to the consumers—to use a somewhat extravagant simile—simply as an endeavor to make that ugly monster, a heavy gas bill, presentable and acceptable by the aid of a brilliant dress and gorgeous trappings. The second reason is—and we must face the fact—that the relations between "cook" and "master and mistress" are not, as a general rule, such as will make the recommendation of comfort and saving of labor in a kitchen a prominent inducement to the latter to incur the expense and trouble consequent upon the introduction of a new cooking stove, when the existing apparatus answers fairly well. For these reasons I venture, with proper deference, to make the suggestion that the question of economy, presently to be fully illustrated, should be the primary and most prominent argument addressed to possible users of gas stoves.

No doubt some useful information in connection with this subject will be forthcoming when the results of the tests in connection with the recent International Electric and Gas Exhibition at the Crystal Palace are published. Meanwhile let us turn our attention to the experiments made in connection with the exhibitions held at South Kensington and in Manchester, carried out under the auspices of the Smoke Abatement Institution by their Testing Engineer, Mr. D. Kinnear Clark, and the results of which are to be found in the "Official Report of the Smoke Abatement Committee, 1882," pp. 99, 110, 158. This book was reviewed in the *Journal* some time since, and in the review the ability and impartiality with which the tests were arranged and carried out, and the efficient manner in which the numerous details of this very complicated subject are placed before the reader in the pages of the report, were most justly and appropriately acknowledged. But it is remarkable that, in a report devoted to the subject of smoke abatement, the fact that the claims of a certain smokeless fuel as a cooking agent (as compared with other fuels more or less liable, in ordinary use, to produce smoke) of admittedly greater simplicity, and cheaper in the first cost, should not receive full practical illustration; particularly as the advantages of the increased use of this smokeless fuel have been at all times under the attention of the smoke abatement movement. There is no intention of attempting to impugn the impartiality and accuracy of the tests, or of raising even the slight suggestion or imputation, as regards the report, of intentional unfairness against the interests of gas. But all interested in the sale of this commodity are entitled to complain of being slighted when they find—in a report which prominently sets forth that, according to the experiments, gas is more expensive than coal for the continuous heating or warming of rooms, and more costly as a motor than a specialty in water gas—the fact that the cooking experiments show some advantage, in point of economy, in favor of gas is passed over without comment.

Before proceeding to quote a few of Mr. Clark's results, it will be well to glance at some generally accepted tests, which are frequently quoted by gas engineers and others. The will be found in the very complete article on "Cooking and Heating by Gas," contained in the third volume of "King's Treatise on Coal Gas;" and the following is an extract:

Table I.

Authority.	Weight of Meat Cooked.	Time Occupied in Cooking.	Cubic Feet of Gas Used.	Loss in Weight, per cent.
	lbs. oz.	h. m.		
Magnus Ohren, 1869.	10 14	2 37	46.0	8.0
" " "	9 7	2 30	42.0	6.3
" " "	11 0	2 45	48.0	8.0
Henry Woodall, 1879.	10 14	.....	25.5	4.5
" " "	10 10	.....	32.0	8.8

The above tests were made with cooking stoves as ordinarily supplied, and the weight quoted is that of the meat *before* being put into the oven.

Mr. Clark's tests include roasting a joint, and baking pastry at the conclusion of the roasting operation; also the quantity of gas required to raise half a gallon of water to boiling point, when placed in a copper pan over one of the boiling burners. As to the latter experiments, I need say but little; for it is well known that coal is altogether out of the field as compared with the small boiling burners, which can be used for boiling, frying, toasting, heating irons, etc. Mr. Lewis Thompson showed thirty years since, when gas was double the price that is now generally charged, that, for these purposes, gas was more than three times as cheap as coal. But it should be remarked that Mr. Clark was rather unfortunate in selecting the size of his "standard copper pan," or in some other respect; for the average of his experiments shows that 6 cubic feet of gas and 20 minutes' time were required to raise the half gallon of water from 52° to 212°. This works out to 133 units of heat per cubic foot of gas used, or less than one-fifth of the theoretical heating power. It is well known that, with a common tin kettle and a boiling stove as ordinarily sold by gas fitters, much better results can be realized. I have tried many experiments on this point, and the average results obtained are half a gallon of water rised to boiling point in 11 minutes, with a consumption of 2 cubic feet (often less) at the usual pressure of 1 inch. Many results have been published, from time to time, by various observers, and they all show that at least half of the theoretical power of gas can be realized in practice—or (say) three times the work obtained by Mr. Clark. It is possible, taking a large stove that has been out of use for a sufficient time to acquire the atmospheric temperature, and lighting one of the boiling burners only, that a large quantity of heat might be abstracted by conduction to the ironwork of the stove; and this may or may not be sufficient to account for the low results.

Turning to the roasting and baking tests, it is evident that these take gas cooking at the weakest economical point; and as gas passes this ordeal triumphantly, it may confidently be assumed to be capable of passing all others, so far as cooking is concerned. These tests were conducted in a manner by no means fortunate for the gas, as will be rendered obvious by noting the period of time occupied in the cooking operations. Some minutes were lost, and from 3 to 7 cubic feet of gas consumed, in heating up the oven to the roasting temperature, before putting in the joint. This is quite an unnecessary proceeding; for the gas stove, as ordinarily made, will get hot quite as soon as, if not sooner than the joint. The usual practice is to light the gas and put in the joint immediately; so the reason for assuming, and allowing it to go forth, that the gas must be burnt in a stove for some few minutes before the joint is put in, is not very obvious. Also the reason for waiting until the joint was done before putting in the pastry is by no means plain. According to one of the tests the pastry was well done at a temperature of 290° F. It also appears that most of the ovens had reached this temperature before the conclusion of the roasting. But the procedure was, after withdrawing the joint, to heat the oven to about 350°, and then bake the pastry. If the pastry could be fairly done at 290°, why use more gas in heating the oven, in some cases up to 400°? for it is one of the objects of the Institution to teach economy in the use of fuel.

TABLE III.

Official Number.	Weight of Joint.	Time Occupied in Cooking.	Cubic Feet of Gas Used.	Loss per cent.
	lbs. oz.	h. m.		
Kensington, No. 1...	12 14	2 25	45.5	17
" No. 3...	12 8	3 7	33.0	4¾
" No. 9...	12 12	3 12	34.0	15½
" No. 13...	12 8	2 25	35.0	17½
Manchester, No. 3...	12 8	2 12	27.5	13¾
" No. 4...	12 1	2 14	29.0	9⅓
		Average...	34.0	

If these experiments had been conducted according to the usual custom in practice, putting in the joint immediately after lighting the gas, and cooking the pastry during the last quarter of an hour of roasting, the results would have been much more favorable, though not unjustly so, to the gas.

Comparing the tests at Kensington with those made at Manchester a few months later, we find a remarkable difference in favor of the latter. A stove which required 45.5 cubic feet of gas to do its work at Kensington, only used 27.5 cubic feet at Manchester; another stove, 45 cubic feet against 29 cubic feet. Referring to Table II., it will be seen that this was due to the experiments being performed in less time than in the latter case. How is this? Why should a stove require 45 cubic feet of gas, and more than 3 hours, at Kensington, while it could do the same amount of work in three-fourths of the time, with 60 per cent. of the gas, at Manchester? In these days of ballooning and quick expresses, it will soon become a question for the London householder—since cooking can be done for two-thirds of the cost at Manchester—whether it will not be worth while for him to despatch his joints and pastry to that city for preparation. If the problem of sufficiently quick means of communication and carriage can be solved, the economy thus secured would certainly cover the cost of carriage. This scheme may be commended to the consideration of financial "promotors," who now find their "occupation gone," so far as the electric light is concerned. Turning to the report for explanation, we find that the anomaly is partially ascribed to improvements "in the apparatus." This brings to mind the story of the Irishman who went to a shop to purchase a fire-grate, and was shown a patent stove "that would save half his fuel." "Will it?" he exclaimed, with surprise. "Then I'll take two stoves, and save the lot." If the result of exhibitions is to improve gas stoves, to such an extent as to economize 35 per cent. of gas, and this within the brief space of a few months, we may soon expect to see gas stove manufacturers in a fair way to practically realize the reasoning of the Irishman, and turning out apparatus that uses no gas at all.

Now let us compare the tests with a few of those accepted as authoritative by gas engineers. Referring to Tables I. and II., we find the Manchester tests show some improvement on the results obtained by Mr. Woodall in 1879; and the improvements in stoves (as shown by comparing current results with those obtained by Mr. Magnus Ohren in 1869) are very creditable to the makers of such articles. The column of "Loss per Cent." occasions some surprise. It has always passed current with gas engineers, as well as with independent experimenters, that gas cooking effects an economy with respect to loss of weight; 10 per cent. having rarely, if ever, been exceeded. Mr. Clark, however, reaches 16, 17, and 17½ per cent. of loss. Is this additional loss due to the increased ventilation of the roasting oven, which is now usual? We know that the loss of weight, when a joint is roasted before an open fire, is as much as 30 per cent., or more. It is certainly difficult to account for the wide variations in this respect. A joint was roasted in a gas stove, and only lost 4¾ per cent.; a joint af a similar kind was cooked in a stove alike in construction, and lost 17½ per cent.—nearly four times as much. Who would have thought it!

Turning to the coal-using kitcheners, we must remember that all previous comparisons between the cost of gas and coal have dealt with the latter fuel as ordinarily used; whereas, in these circumstances, it is under "trial conditions." Gas is so simple and easy of application that there is no difficulty in realizing equally good results in ordinary use as those obtained in careful experiments. But with solid fuels, as is well known, the case is very different; and a great deal depends upon the skill of the experimenter. This is aptly illustrated by a remark made by Mr. Clark on page 95 of the report: "The smoke shades are much darker under the ordinary (?) attention given to the open grates in the daily routine of the exhibition than under the better management with which the special tests were conducted." If this is so, how would they appear under the *extremely ordinary* attention of the average domestic?

The tests chosen for quotation are in each case (see Tables II. and III.) those giving the best results; it being considered only just to both fuels to select the best apparatus. In the case of the gas stoves the best tes's quoted were obtained with apparatus that is very generally used—that is, ovens with atmospheric gas jets at the bottom; though the very small number of appliances tested (only 13 different makes) scarcely affords sufficient data to offer any ground for an opinion as to which is the best kind of stove. As in the case of the gas stoves, the Manchester tests with coal ranges show a remarkable superiority as compared with those at Kensington; and, in order to secure fair results, tests from both places have been taken in each case. The average work done is as nearly as possible equal; so the average results should afford a comparison that is fair on both sides.

TABLE III.

Number of Test.	Weight of Joint.	Loss per cent.	Coal Used.	Wood Used.
Kensington, No. 5...	12 lbs. 9 oz.	9.0	12½ lbs. steam.	2 lbs.
" No. 9...	12 " 14 "	10.7	13 " "	2 "
" No. 15...	11 " 10 "	9.7	16 " "	1½ "
" No. 17...	12 " 2 "	15.5	14½ " "	1 "
" No. 20...	11 " 2 "	9.5	7¼ " anthracite.	1½ "
" No. 21...	12 " 7 "	10.5	15 " "	2 "
Manchester, No. 1...	11 " 3 "	11.0	8¼ " "	not given
" No. 2...	12 " 13 "	11.5	10 " "	"
	Average...		12 lbs. Average..	1⅔ lbs.

Comparing Tables II. and III., the average result of the experiments comes out as 34 cubic feet of gas on the one hand, against 12 pounds of coal and 1⅔ pounds of wood on the other. It is not necessary to go into the prices of these two fuels respectively. Taken in connection with the considerations already noticed, they warrant the assertion made at the commencement of this article, that, under most circumstances, gas will be cheaper than coal in ordinary use.

The tests also show another advantage of gas cooking. The time required, under Mr. Clark's procedure, for heating up the gas stoves to 250° F., varied from 5 to 25 minutes; and, for nearly all purposes, gas may be said to be ready for use at a moment's notice. Some of the coal-burning kitcheners were ready for use in half an hour; but the majority required 40 minutes, an hour, and even more, for heating up.

In conclusion, we may glance at the remarks of the Jurors as to the tests (Reports III and IV., "Official Report," pp. 17, 22). There is nothing in respect to the kitcheners that calls for special mention; but they were evidently much taken with the capabilities of gas, as shown by the following extracts:

"The display of gas cooking and heating apparatus was very extensive, * * * proving to demonstration the great capabilities of coal gas as a substitute for solid fuel * * * so absolutely smokeless in character and convenient in application, * * * not only without pecuniary loss as compared with coal, but in many instances with positive gain. * * * The fact that a 12 pound joint can be cooked in London at a cost of very little more that 1d. for gas, ought to prevail with many a householder to try gas cooking."

DOWSON GAS.

In continuance of his "Notes," Mr. Humphreys devotes the second article to a consideration of "Dowson Gas." The writer says—

The report mentions two distinct appliances for the generation of gas from solid fuel. These are the Wilson gas producer and the Dowson gas producer. The former was not submitted to tests; although it was claimed by the makers that the gas produced by it would cost less than ¼d. per 1,000 cubic feet. The latter was tested; and I am about to notice the results. Both systems are alike in principle. They include the admission of steam, together with an induced current of air, into the base of a chamber containing a deep layer of carbonaceous fuel. That gas can be produced in this manner, and at a cheap rate, is well known; and numerous attempts have been made to bring gas so prepared into competition with coal gas. But hitherto these have been without success; and with disastrous consequences to those who, deluded by the sanguine representations of confident inventors, have invested their money in such schemes.

The fact that it is claimed, according to the experiments, that the Dowson gas will compete (as a heating agent, and also as a source of power) very favorably with coal gas in point of cost, led the writer to examine this speciality with the view of ascertaining in what new and improved process the alleged cheapness lay; considering himself entitled, as a gas engineeer, to freely criticise anything put forward as being cheaper or better than gas. By way of comparison, the following tables have been worked out, showing respectively the parts by volume of heat producers, and gases which produce no heat (being incombustible, and therefore acting only as diluents); the

same calculated to parts by weight; also the specific gravity and theoretical heating power of water gas produced by passing steam over an excess of incandescent carbonaceous fuel, of the Dowson gas, of "producer gas" obtained by passing air (without steam) over an excess of incandescent carbonaceous fuel, and of common coal gas respectively.

It will be seen that the Dowson gas occupies a position between water gas and producer gas; or it may be said to consist of producer gas mixed with a small proportion of water gas. Thus it is found that whereas in the producer gas the sole heating agent is carbonic oxide, there is in addition a small quantity of hydrogen—1.7 per cent.—in the Dowson gas.

Parts, by Volume, of Heat Producers.

	Water Gas. Per cent.	Dowson Gas. Per cent.	Producer Gas. Per cent.	Coal Gas. Per cent.
Hydrogen	50	20	nil	46
Carbonic oxide	45	30	30	7.5
Hydrocarbons	nil	nil	nil	43.3
Parts, by Volume, of Diluents.				
Nitrogen	nil	47	67	0.5
Water vapor	nil	nil	nil	2.0
Carbonic acid	5	3	3	0.7
	100	100	100	100.0
Parts, by Weight, of Heat Producers.				
Hydrogen	6.3	1.7	nil	8.2
Carbonic oxide	80.0	36.1	29.4	18.7
Hydrocarbons	nil	nil	nil	65.9
Parts, by Weight, of Diluents.				
Nitrogen	nil	56.5	65.9	1.2
Water vapor	nil	nil	nil	3.2
Carbonic acid	13.7	5.7	4.7	2.8
	100.0	100.0	100.0	100.0
Calculated heat per lb.	7490 units.	2687 units.	1314 units.	22,661 units.
Calculated heat per c. ft.	312.1 "	161.6 "	98.0 "	674.0 "
Specific gravity (hydrogen = 1)	7.9	11.64	14.24	5.6
Cubic feet, per lb.	24.0	16.6	13.3	33.6

The Dowson gas is called "cheap;" but, as will be seen, it is also very dilute, being not much better than common producer gas in this respect. The latter contains 70 per cent. by volume, and rather more than the same proportion by weight, of useless gases; while the Dowson gas contains 50 per cent. by volume, and 62.2 per cent. by weight. Consequently 1 pound of Dowson gas only yields, according to theory, 2687 heat units on combustion; while 1 pound of common coal gas produced 22,661 units. The Dowson gas may be cheap; but it is rather poor stuff. Small beer is cheap; but many people prefer to pay a higher price for the better quality "first brewing." And if it is worth while to use gas of such poor quality, it is questionable whether it would not, for many purposes, be preferable to use producer gas as made by the ordinary methods; especially if a steam jet be employed at the bottom of the generator, by which means a small proportion of hydrogen would be added to the gas. About one-eighth by weight of the latter consists of carbon; and therefore 1 cwt. of coke or anthracite (reckoning it to contain 95 per cent. of pure carbon) would yield about 850 pounds, or 11,300 cubic feet of gas. This, taking Mr. Clark's estimate of 5 per cent. per annum for wear and tear of apparatus, and 5 per cent. interest, would come out much cheaper, in proportion to its quality, than Dowson gas.

Mr. Dowson, in common with many other inventors, has sought to utilize a portion of the heat produced in the generator for the purpose of decomposing water, and thus enriching his ultimate product with hydrogen—a gas of great heating power. The water is first converted into steam of 25 pounds pressure (by using a portion of the gas produced), and then injected into the furnace. This steam jet produces a strong blast of mixed steam and air; the latter being drawn in by the arrangement of the steam jet. The blast produces a sufficient intensity of heat to decompose the water by the well known reaction,

$$H_2O + C = H_2 + CO.$$

If a source of waste steam is at hand, it can be used instead of the water, with some advantage in point of economy.

Now let us turn to Mr. Clark's account of the apparatus, and his experiment therewith. The substance of his description is as follows:—Mr. Dowson passes a mixture of steam and air through a fire (*Query*—through incandescent carbonaceous matter, which is rather a different thing); and he employs special means for generating and superheating the steam, consisting of a long coil or tube of such a form that nearly the whole of it is exposed to the action of a gas flame, the gas for which is drawn from the gasholder. Water is forced, under a pressure of 20 to 25 pounds per square inch, into the coil. The generator is of iron, lined with ganister, and the fuel rests on a grate above an inclosed chamber, into which a jet of the superheated steam is directed through a small opening, carrying with it by induction a current of air into the furnace.

The experiment lasted rather more than 3 hours, during which time 69½ pounds of anthracite were charged into the generator—6 pounds at a time. At the conclusion, 18½ pounds were withdrawn; showing a net consumption of 51 pounds. Mr. Clark does not say whether the ash and residue from the 69½ pounds of coal used (which, presumably, would amount to 4 or 5 pounds) are included in this 18½ pounds. Mr. Clark calculates that 11½ pounds were used "in getting up the fire;" leaving a consumption of 39½ pounds for making gas. The actual quantity of gas made is not stated; and Mr. Clark argues it out in a roundabout way. Having stated that, of the time occupied during the experiment, half an hour was required to get up the fire—leaving 2½ hours actually occupied in generating gas—he goes on to say: "The gas was generated at the rate of 1,175.5 cubic feet per hour, being exclusive of the gas used for generating steam. This portion is estimated at the rate of 100 cubic feet per hour; and makes a gross total of 1,277.5 cubic feet." Why was not the actual quantity of gas produced passed through a meter, or into a gasholder, and measured? For the rate of production—which may vary from minute to minute—is by no means an accurate method of measurement. Proceeding to argue on this assumed production, Mr. Clark calculates that the consumption of coal is 13.17 pounds per 1,000 cubic feet net production of gas, not including the gas used for producing steam. From these meagre data he gets the following estimate of the cost of Dowson gas, for a working day of 9 hours:

Anthracite, 1 cwt., at 16s	0s.	9½d.
Wages	1	0
Maintenance, 5 per cent. on £125	0	5
Interest, 5 per cent	0	5
	2s.	7½d.
Gas produced	9,000 cubic feet.	
Less used in apparatus	1,000 "	
Net production	8,000 cubic feet.	

—which works out to 4d. per 1,000 cubic feet.

This estimate is too favorable in many respects. As to the coal, Mr. Clark takes no account of that required for getting up the fire at the commencement of the process, and which he found to be 11½ pounds. In an apparatus standing idle for 15 hours, even with every precaution in the way of "damping down," some coal must be used for getting up the fire at the commencement of the day's work. This may be reckoned as 1d. additional cost of coal. As to the wages, these are set down as 1s. per day; but this is obviously too little. Mr. Clark found that the furnace required rather more than 13 charges in 185 minutes—say one charge each 15 minutes. Then there is about three-quarters of a gallon of water per hour to be pumped into the superheater, which is probably supplied continuously by some kind of accumulator. Nothing is said about what becomes of the ash from the coal, which presumably falls through into the closed chamber; but this must need some attention and removal. The outlet pipes, too, would probably require occasional cleansing from sooty and tarry matters. Altogether the labor in connection with the working of the apparatus would occupy a man nearly half his time; and therefore 1s. 6d. would be much nearer the mark for this item than Mr. Clark's 1s. The item of maintenance is also too low; 5d. per day comes to only £6 10s. per annum, and this sum is not merely to provide for the repairs, but for the depreciation of the apparatus as well. So far as the tubes and fittings are concerned, 5 per cent. is fair enough; but it is not necessary to tell gas engineers that a small furnace, into which a mixture of steam and air is continually being blown, and in which a degree of temperature high enough to decompose water is maintained, is not likely to possess any great durability. Again, £12 10s. per annum is a very moderate estimate for the repairs, maintenance, and depreciation of an apparatus of this sort—costing £125 in the first place. Taking all these considerations into account, the cost of the gas works out as follows:

Coal	0s.	10½d.
Wages	1	6
Maintenance	0	9½
Interest	0	5
	3s.	7½d.

—or about 5½d. per 1,000 feet. And it must be remembered that the results on which I am arguing were realized in a short trial experiment on a small scale; while experience shows that the results of laboratory experiment cannot be substantiated under ordinary working circumstances.

The idea of using the gas produced for the purpose of generating the steam supply is certainly ingenious; for it constitutes a self-acting regulator on the quality of the gas. The proper proportion of steam and air is essential to

the proper quality of the gas; and if the steam was supplied in excess, the depreciation in the quality of the gas produced would have the effect of automatically lessening the supply of steam. This appears to be the only novel point in the principle of the apparatus, although, no doubt, there are many improvements in detail.

For the gross production of 1,000 cubic feet of the Dowson gas, Mr. Clark calculates that there were used 12.13 pounds of coal, and water at the rate of 0.466 pound per pound of coal, or 5.65 pounds of water; making a total of 11.52 pounds of pure carbon (95 per cent. of the coal), 0.86 pounds of hydrogen, and 6.94 pounds of oxygen. According to the foregoing calculation, 1,000 cubic feet of the gas weigh 60 pounds; and consisting of 10.2 pounds of carbon, 1 pound of hydrogen, 14.9 pounds of oxygen, and 33.9 pounds of nitrogen. So that of the total weight of the gas, only about 30 per cent. is derived from the materials, the remaining 70 per cent. being supplied by the atmosphere. There is an apparent loss of carbon; but possibly the coal did not contain so much as 95 per cent. of this substance. A small proportion of hydrogen, the difference between that supplied by the steam and that in the gas—viz., 0.14 pound—is no doubt derived from the coal.

Comparing the power of producer gas with that of the Dowson gas, we see the theoretical advantage gained by injecting steam at the bottom of the furnace; and the attention of gas engineers who are now practically trying the generator furnace is directed to this point. It should be observed that, in order to produce the hydrogen, as much heat must be expended as is ultimately gained from it. The hydrogen is obtained by the decomposition of water, and is again combined with oxygen to form water by the act of combustion. Therefore no real gain of heat follows. But it happens that heat which would otherwise be wasted can be utilized to decompose the water. The fuel in the generator, while in the act of burning into carbonic oxide, gives off much heat; and this, if not otherwise used, would go to raise the temperature of the gases produced, or be lost by radiation from the furnaces. Obviously, if the producer gases be passed directly into the furnace, before they can be cooled by radiation or conduction, the heat need not be lost. But where the gases must be stored, the advantage of the use of steam is very obvious; and this apart from the well-known practical advantage resulting from the use of steam at the base of the furnace. Mr. Dowson's gas produces 161.6 units of heat per cubic foot, of which 97.6 are due to the carbonic oxide, and 64 to the hydrogen. To obtain these 64 units, however, one-ninth of the total quantity produced—say 18 units—are required for heating the water and converting it into steam; leaving 48 units of heat obtained from the generator in a utilizable form, which heat would otherwise have been wasted when the gases were cooled.

In recommending the use of Dowson gas for domestic purposes and industrial use, the fact is overlooked that it is not purified in any way; and therefore any impurities—such as sulphur, ammonia, etc.—originally present in the coal would be poured into the atmosphere just as would be the case if the coal were burned in the ordinary manner. But as regards coal gas, with a trifling and unimportant exception, all impurities are left at the works. It is scarcely fair to place an unpurified gas on equal terms with pure gas.

Changes in the English Patent Laws.

The English Parliament recently passed an Act to amend and consolidate the laws relating to the issuing of patents for inventions, registration of designs and trade marks, the same to become operative on January 1st, 1884.

The main changes are the following:

The Government fees on application for provisional protection are reduced from £5 to £1, and the Government fees for completing the patent for the first term (four years in place of three, as at present) are reduced from £20 to £3, so that the patent will be granted for a term of four years for a sum of £4.

There is no alteration in the amount of the subsequent payments for the extension of patents from four to fourteen years, but in place of paying the £50 and £100 duties in lump sums at the end of the third and seventh year, these sums are now payable at the option of the patentee either in one sum of £50 at the end of the fourth year, and one sum of £100 at the end of the eighth year, or by annual payments of £10 before the end of the fourth, fifth, sixth, and seventh years; £15 before the end of the eighth and ninth years; and £20 before the end of the tenth, eleventh, twelfth, and thirteenth years.

Patents will be granted to the inventor jointly with others, but the inventor must in every case make a declaration that he is the true and first inventor.

Applicants for patents may, if they so think fit, transact all their business with the Patent Office by post, and the various post-offices throughout the country are to keep on sale the stamped papers required in applications for patents. Each application for a patent is to be confined to one invention only.

The procedure on application is as follows:

The inventor must lodge at the Patent Office a declaration and provisional specification. These documents, in place of being referred to the law officers for examination, are to be referred to an examiner. The examiner's duties are to see that the provisional specification fairly describes the invention, and to see that the title of the invention sufficiently indicates the object of the invention. The examiner has also to report to the Comptroller (the officer at the head of the Patent Office) whether the application conflicts with any other unsealed application in the office.

The provisional specification having been approved, the applicant must then prepare his final specification, and lodge it at the Patent Office within nine months from the date of application. This specification is again referred to an examiner, who has to ascertain that the specification is properly prepared, and is consistent with the provisional specification. The examiner in the cases of both provisional and complete specifications, is to report to the Comptroller. If the applicant is dissatisfied with the decision in either case, he can appeal to the law officers. If the complete specification be not accepted within twelve months from the date of application, the application is to become void.

The patent is sealed after the final specification has been passed by the Comptroller.

The provisional specification remains secret until the complete specification is filed, but after that both provisional and complete specifications are to be open to public inspection.

Specifications may be amended by the way of disclaimer, correction, or explanation. The Comptroller is to decide upon all applications of this nature, there being an appeal from his decision to the law officers. A very important provision is also introduced for the purpose of enabling the patentee to disclaim, by leave of the judge, during the progress of an action, and without any stay of proceedings.

The Board of Trade has power to grant the compulsory licenses in default of the patentee granting licenses on reasonable terms, and on proof that

(*a*) The patent is not being worked in the United Kingdom.

(*b*) The reasonable requirements of the public are not supplied.

(*c*) Any person is prevented from working or using to the best advantage an invention of which he is possessed.

The jurisdiction of the Privy Council in cases of prolongations of patents is retained, but the almost obsolete power given to the Privy Council to confirm patents is not re-enacted.

The action of *scire facias* is abolished, but revocations of patents may be obtained on application to the Court.

The right of the Crown to the free use of patented inventions is abolished, but the Crown is to be at liberty to use patented inventions on terms to be settled by the Treasury.

In all legal proceedings with respect to patents the Court may, and at the request of either party shall, call in the aid of an assessor.

Letters patent may be granted to the personal representatives of deceased inventors.

The clause of the Patent Law Amendment Act, 1852, by which the British patent lapsed with the expiry of any foreign patent of anterior date, is not re-enacted.

The provisions as to the registration of documents at the Patent Office, the printing and publication of specifications, and the preparation of indexes and abridgements, are not substantially altered.

The Comptroller is to issue an illustrated journal of patent inventions as well as reports of patent cases, and is to keep this journal, and complete specifications of all patents in force, on sale.

Power is taken to join the International Union for the reciprocal protection of patents, and when this is done the anterior publication of a foreign specification will not (for a limited time) affect the British application.

Iron Versus Tin-Incased Wooden Shutters.

Mr. Edward Atkinson thinks that of all materials in common use, and which are commonly depended upon for preventing destruction by fire, there is none so treacherous as unprotected iron, with the possible exception of granite. Iron doors and iron shutters may have occasionally appeared to prevent the passage of fire through a window or doorway; but such successes can only have been attained either by their not being subjected to great heat, or else by their being drenched and kept cool with water. Whenever and wherever they have been exposed to severe heat, they have been so quickly warped and twisted as to have become practically useless as safeguards, while they have often prevented access to buildings, and have thus greatly increased the loss or damage from the fire raging within. There is nothing yet invented which can be said to be absolutely fireproof by which window spaces or doorways can be protected; but the heavy wooden door or shutter incased in tin will retard the action of fire in sufficient measure to give the firemen a fair chance to put it out in the room in

which it starts. If two thicknesses of inch board (pine preferred, because it does not warp) are nailed crossways and fully incased in tin, locked and soldered, and thoroughly nailed under the locking, the outer surface of the wood under the tin will be speedily reduced to charcoal by the action of heat through the combustion of the small amount of oxygen under the tin. The charcoal itself then becomes a very effective non-conductor of heat, and if the tin is tight, so that no further supply of oxygen reaches the unburnt wood beneath the charcoal, it will remain cool and strong for some hours, thus giving time to control the fire where it starts.

Mixing Lime with Coal During the Process of Carbonization.

In the address of Mr. Charles Eastwood, delivered before the Fifty-fifth Quarterly Meeting of the Manchester District Institution of Gas Engineers, we find an account of some experiments instituted by the author with the purport of ascertaining the commercial results to be obtained by mixing lime with the coal carbonized in the retorts, for the purpose of obtaining an increased yield of ammonia from the coal. The speaker stated that these experiments were each of one week's duration, with coal from the same seam and practically of uniform character. The quantity of lime used was 1 cwt. of slaked lime per ton of coal, which is about 2½ per cent. of unslaked lime. The following are the results:

	Without Lime. Per Ton.	With Lime. Per Ton.
Quantity of coal used	56 tons.	48 tons.
Quantity of gas made, in cubic feet	9371	8363
Illuminating power of gas, sperm candles.	17.40	18.12
Value of gas in pounds of sperm	559	550.5
Coke made, in pounds	1540	1633
Tar made, in pounds	147	140
Ammonia produced, in pounds, by distillation with lime	4.773	5.669
Specific gravity of the tar from hydraulic main	1172.5	1155
Specific gravity of the tar from the condensers	1142.5	1110
Ammoniacal liquor from the hydraulic and the condensers, in pounds	168	169
Specific gravity of the liquor	1030	1026
Ammonia contained, in pounds, with lime distillation	4.435	3.976
Ammoniacal liquor from washer, pounds.	184	196
Ammonia contained, in pounds	0.338	1.693

I will now draw your attention to some of the details of these experiments. First, the make of gas was less per ton with lime than without it. This was caused by the lime contained in the coke making a flux in the furnaces, and thereby reduced the temperature of the retorts. This clinkering on the furnace bars was a serious difficulty. The men had to clean them more frequently, and as the inevitable consequence, the gas was of a higher quality —viz., 18.12 candles, as against 17.40 candles. This brought up the returns, in pounds of sperm per ton of coal, to nearly the same figure—viz., 550.5 pounds with lime, as against 559 pounds without it.

The weight of coke per ton of coal was more with lime than without it, by about the weight of lime which had been used; but the quality of the coke was seriously deteriorated, and would, I fear, be a reduction of its value far in excess of the incresed value of the ammonia obtained.

One of the most noticeable features observed was in the character of the tar produced. Its specific gravity, with lime added, was, from the hydraulic main, 1155, as against 1172.5 without it; and 1110, as against 1142.5, from the condensers. To have had a proper comparison of their respective values, these tars should have been analyzed; for which purpose I should require the assistance of an expert well skilled in the distillation of tar.

I now come to the consideration of the quantity of ammonia produced by the two methods. With the addition of lime, we obtained 5.669 pounds per ton, as against 4.773 pounds without it; being an increase of 18.8 per cent. This, if we value ammonia at 6d. per pound, is equal to 5d. per ton of coal. But as the value of the lime used was 4½d., the net gain was only ½d., from which must be deducted the deterioration of the coke. There thus would be a loss instead of a gain by the process.

It is, however, interesting to note the alteration made in the character as well as in the quantity of the ammonia obtained at the different points—viz., from condensation in the hydraulic and the condensers, and that taken from the gas in the washers. The quantity of ammonia contained in the liquor due to condensation, by the distillation test, was as follows: Ammonia, equal to 3.976 pounds per ton of coal, with lime; without lime, 4.435 pounds per ton. The quantity of ammonia contained in the liquor obtained from the washers, which had been supplied with clean water (by the distillation test), was as follows: With lime added, the ammonia was equal to only 0.338 pound per ton of coal. This shows that the increased yield of ammonia was in the form of "free ammonia," which had to be removed from the gas by washing it with water, and which would require that a larger provision, of an efficient character, must be made for washing the gas.

The chief points of interest are that, by the use of lime, there is an increased production of "free ammonia" to be obtained by washing the gas with water; that there is a great difference in the character of the tar produced; and that the lime deteriorates the quality of the coke. This has the effect of preventing the proper combustion of the fuel used, with the consequent reduction of the temperature of the retorts—thus limiting the yield of gas, which is, however, of a better quality. This may probably be due to some unexplained effect of the lime upon the heavy hydrocarbons, which may be split up and rendered available for enriching the gas produced. The net result of it all, to my mind, is that the practice of mixing lime with the coal will not pay.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

A Piece of Carbon Makes a Blaze.—At La Crosse, Wis., on the night of Monday, September 17, police officer Stroughtenburg discovered a blaze in the store of Quinn & Batchelder, situated on the corner of Second and Main streets. He broke in the door and discovered that the trouble was made by a piece of carbon that had dropped from an electric light. He extinguished the fire and turned off the light. Those who will use the arc light should see to it that the globes surrounding the same are securely guarded at the bottom.

Annual Meeting of the Citizens Gas Light Company, of Vincennes, Ind.—The annual meeting of the Citizens Gas Light Company, of Vincennes, Ind., was held on Monday, September 3, at the office of the company. After the reading of the Annual Report to the stockholders, directors were elected, as follows: Messrs. J. H. Rabb, George G. Reily, W. H. De Wolf, J. L. Bayard, Edward Watson, S. N. Chambers, George G. Ramsdell. Upon the conclusion of the stockholders' meeting, the directors met and organized, as follows: President, Dr. J. H. Rabb; Secretary and Treasurer, George G. Ramsdell.

Fire in a Gas Works.—On September 19 an explosion in some portion of the Lowe water gas apparatus in the gas works at Keene, N. H., caused a fire which resulted in a loss of $1,000. A workman named Eustis was injured about the face and hands. The property was not insured.

Bursting of English Electric Light Bubbles.—One of our New York daily journals says that the collapse in electric light shares in England appears to be complete, and furnishes the following interesting figures in connection with the same. Anglo-American Brush, which at one time sold at £40, is quoted at £2½ to £3 for £7 paid, and £5¾ to £6½ for £10 paid. Brush electric light and power sells at 10s. to 15s. for £2½ paid. Maxim-Weston, at 1-16 to 3-16 for £1 paid, and other electric light and power shares in like proportion to their nominal par. A number of the companies which were launched a year or so ago, with a great flourish of trumpets, and apparently with great success, are now in the hands of official liquidators.

Gas Matters at Austin, Texas.—When the question of the renewal of the contract for supplying gas to the State Lunatic Asylum at Austin, Texas, came up for consideration, it was found that two bids had been submitted, one by the Austin Gas Light and Coal Company, and the other by the opposition gas company engaged in the manufacture of water gas. The Board of Managers of the institution, after having been informed of the relative composition of the two gases, inserted a clause in the contract calling for the furnishing of a gas which would not contain more than 10 per cent. of carbonic oxide. The Austin Gas Light and Coal Company was awarded a six years' contract at the rate of $2.45 per 1,000 cubic feet.

Cheaper Gas for Grand Rapids, Michigan.—Mr. Thomas D. Gilbert, Secretary and Treasurer of the Grand Rapids (Mich.) Gas Light Company, has caused the following notice to be published in the daily papers of that city—

To the Customers of the Gas Company: It is well known to business men that the price at which any commodity can be offered depends largely upon the quantity that can be sold. This is pre-eminently the case in the business of making and distributing gas.

The gas company of this city has always pursued the policy of reducing the price of gas as fast as the increased demand incident to the growth of the city would justify it, and, as a result, its customers have always had good light, and at a less price than any other Western city. Contrary to the expectations of the company, when electric lighting was introduced, its business has increased 20 per cent. in the past two years, justifying another re-

duction in the price of gas. The announcement is therefore made of the following scale of prices, to stand until further notice :

Commencing with gas used after October 1, those who burn 5,000 feet or more, in any month in one locality, will be charged for that month $2.00 per 1,000 gross, and $1.60 net ; between 1,000 and 5,000 feet, $2.00 gross, and $1.80 net ; for less than 1,000 feet, $2.50 gross, and $2.00 net—the net price being only to those who make prompt payment.

Grand Rapids is located in Western Michigan, containing a population of 40,000 inhabitants, and the municipal authorities who govern its affairs have had the good sense to discourage opposition in the matter of the manufacture and distribution of gas within its borders. The Grand Rapids Gas Company, fully appreciating such action, has always reciprocated such treatment by furnishing gas at much lower rates than those current in Western towns. Superintendent Thomas Smith, along with the other officials of this company, must be congratulated upon the success which has attended them in the management of the affairs of the Grand Rapids company.

Personal.—Mr. F. M. Roots, of Connersville, Ind., we are more than glad to announce, has experienced a decided gain in health and spirits, his trip to Waukesha having been of much benefit. Mr. R. has been a great and patient sufferer for a long period, and his many friends in the gas fraternity of the country will hail with pleasure the announcement of his greatly improved condition.

Suit Against a Gas Company.—Action, through guardian, has been begun by Lucy B. Roome against the Fulton Municipal Gas Company, of Brooklyn, N. Y., to recover $15,000 damages for injuries sustained in falling over an obstruction caused by the digging of a trench for the reception of a main in Bridge street.

The Troy (N. Y.) Steam Heating Company a Thing of the Past.—The late cool days experienced by the Trojans suggested the necessity of taking steps to secure artificial heat in their houses. Persons who have heretofore been supplied by the Troy Steam Heating Company have about reached the conclusion that they must look elsewhere for their caloric. It was understood that Capt. J. N. Russell intended to run the works during the coming winter, but it now appears that he has abandoned the intention, even if he ever seriously contemplated doing so. Alderman Gilbert Geer, one of the parties interested in the steam heating company, said that he could give no assurance that the corporation would be in a condition to furnish customers the coming winter. He, himself, intended to make other arrangements for furnishing his residence with heat, and he advised others to do the same. The suspension of this concern will necessitate the introduction of new methods for heating the city hall and other public buildings—the steam company having, when it obtained its franchise, guaranteed to heat the city's edifices at a slight cost. Following out the plan of action pursued by those interested in such undertakings elsewhere, it would seem that the next move would be an effort to construe the steam franchise so as to make it appear that the holders of the charter were entitled, under the provisions of the same, to embark in the business of making and distributing gas; but, then, the Troy gas field appears to be pretty well occupied already—and we cannot exactly see how the stockholders of the Troy Steam Heating Company can do aught else than "grin and bear it."

The Electric Light at Lancaster, Pa.—This heading appears to be somewhat of a misnomer, for the principal trouble appears to be rather the absence of the electric light at Lancaster than the presence of the same. The Maxim electric light people, as we understand it, agreed to be in readiness to supply their light on September 10, and, failing to so do, further agreed to forfeit a penalty in the sum of $10,000. The Maxim company did not keep up to the first part of the agreement, and certainly do not show any great amount of eagerness to comply with and carry out the forfeiture clause. These failures prompt the Lancaster *New Era* to ask how it is that the 10th day of September came and went, and did not bring the Maxim electric light with it. "True, the poles are up, at least in part, but they send out no bright rays to illumine the darkness of our nights. There was a meeting of City Councils last week, but not a member in either body even so much as alluded to the failure of this company to comply with its contract with the city. Does any one know why this is? Is not so glaring a failure to fulfill an important contract of sufficient importance to demand some notice at the hands of our authorities? If there has been sufficient cause for this delay the public is entitled to know it. If there has not been, then the people have a right to know why the City Solicitor has not been instructed to bring suit for the recovery of the $10,000 which the Maxim Electric Light Company agreed by its bond to forfeit in case it failed to comply with its contract. We are tempted to ask why such a penalty was ever inserted in the agreement if there was no intention to demand its payment in case the company did not live up to that agreement? Is the whole thing a farce, and was the thing so understood from the beginning? This time it is not the company alone who must be held culpable. The Lamp Committee, who have special charge of this matter, are also involved. This thing has been entrusted to them. Have they been attending to their duties in a way to meet public expectation or the support of their constituents? It is plain they have not, and yet they have neither in Councils or elsewhere offered a word of explanation. It looks very much as if the city has been trifled with, and that those who are in authority to look after her interests are indifferent about them. It is seldom we have been called to speak of such a glaring case or dereliction on the part of a contractor in so important a matter, and of such utter indifference on the part of public authorities. There will no doubt be a costly plant erected in time, which the city will be asked to purchase at a big price, but it is equally certain the $10,000 penalty will turn out a piece of mere moonshine."

Some Gas Still Sold in Pennsylvania.—Mr. J. Bate, Secretary of the Tiffin (Ohio) Gas Light Company, addressed the following letter to the Journal office :

"Office of Tiffin Gas Light Company,
Tiffin, Ohio, Sept. 9, 1883.

"*Editor* Gas Light Journal : Dear Sir—It is represented here that Wilkes-Barre, Sunbury, and other towns in Pennsylvania are lighted by the Edison incandescent electric light. The representations are that, in these places, the Edison light has displaced gas altogether except for use in street lamps. Please give through your paper, or by letter (if preferred) correct information upon this subject, with such comments as will enable us to understand the present status of the Edison light at these places; and, also, the indications, as they now appear, as to its competing with gas as an illuminator. Respectfully yours,

"J. Bate, Secretary of Tiffin Gas Company."

Persons living in the vicinity of New York city, knowing from experience as to the amount of credence to be placed in the assertions of those pecuniarily interested in the furtherance of various schemes for electric lighting, are apt to pay but little heed to, and place but little value on, the numerous sensational stories set afloat to bolster up the business of electrical purveying. Notwithstanding this state of affairs inquiry was made to the officials of the gas companies in both of the places named in Secretary Bate's letter, and we give below copies of the replies received :

"Office of Wilkes-Barre Gas Company,
Wilkes-Barre, Pa., Sept. 18, 1883.

"*Editor* American Gas Light Journal : Sir—Yours, of September 17 at hand, and, in reply, would say that we have no Edison electric lights in this place. We have a local electric company, employing the Arnoux-Hochhausen system of arc lighting. This company furnishes about 92 lights, using six 15-light dynamos, each run by a separate engine. The light appears to give very good satisfaction. Consumers using this light have offered me their stock at a heavy discount, and some of these will take the lights out when their contracts expire. We welcome the electric light, as our business has increased thirty per cent. since its introduction here.

"Respectfully yours, Marcus Smith, Supt."

"Office of Sunbury Gas Light Company,
Sunbury. Pa., Sept. 18, 1883.

"*Editor* American Gas Light Journal : Sir—Your letter, of September 17, inquiring 'Whether the Edison light had entirely driven illuminating gas from the field of artificial illumination,' is at hand. In answer, I would say that the Edison company began by giving the light, free of cost, to any party that would use it ; and as they started only in July of this year, it is too early yet for our people to know much about the relative cost or convenience of the two systems of illumination. In hotels, where the new light was introduced because of its novelty, they are still burning gas ; and it is sufficient to say that our consumption for August, and thus far in September, has been as great as in any former year.

"The greater part of the business places now using electric light were not formerly lit by gas, but were using coal oil ; and these consumers have not yet had time to learn the cost of electricity. The Edison light is sold here at the rate of one and one-fourth cents per hour, and the candle power is rated at from 10 to 12 candles. We have been selling gas, for years past, at one cent per hour, and supplying, at that figure, a light equal to 14 candles. Our gas stock is as strong to-day as ever ; and, in fact, stronger—for we do not realize our danger if we are in any.

"Our gas light is a better light for all purposes than theirs, and we sell it at one-third less. The largest stores in town are burning gas as usual, and those of our consumers who are using electric light, in most instances, use both. When their wheel stops, of course, every electric light goes out. They run until one or two o'clock, and, after that hour, there is no light for stores, sick rooms, or any other purpose.

"We have made no war upon them here, because we preferred to give our people time to see that their system has no merit over ours—either as to cost or general utility. Mr. Edison will have plenty of work during the next ten

years to bury any live gas company; but this early and extravagant boasting may help him to sell his patents in other localities. Very respectfully,

"T. H. PURDY, Secretary Sunbury Gas Company."

We think that the foregoing correspondence explains itself quite clearly, and most effectually explodes and disposes of the rumors and statements which had reached the ears of Secretary Bate. As to our own opinion of the present status of the incandescent electric lighting problem, we can only reaffirm that which we have so often expressed before. With the resources and methods at the command of those interested in the development of domestic electric lighting in this country at the present day, we cannot see how it is possible that the incandescent light can in any sense be taken as an actual and real competitor in the field of artificial illumination, if the question of the cost of production and distribution is to be considered as a factor in the problem.

Take the city of New York, where immense amounts of money have been invested in the installment of what it was claimed was a perfect specimen of a model and complete system of an electrical manufacturing and distributing plant, constructed and operated under the actual guidance and supervision of Mr. Edison himself, and what do we find as the result? Simply that the company owning the patents and property finds itself in the sole and undisputed possession of less than 10 per cent. of the customers along its line of mains; that its business does not relatively increase; and that both the New York and Mutual Gas Light Companies (in the district of which companies are located the Edison company's station and mains) find themselves in a stronger position than ever, and during the coming winter will find themselves actually taxed to furnish the gas which their consumers will demand to have supplied them. The safest and surest test that can be applied to determine the measure of success attending the operations of any manufacturing company is to glance at the financial barometer as represented by the price at which its stock is quoted on the financial market. The mercury can be safely trusted to foretell squally weather; and business men appear to think that the stock reports carry with them sure and certain indications when financial skies are lowering and murky. If the Edison system is such a grand success, and so many millions lie therein hidden, why is it that the stock, which on its face purports to be worth $100 a share, is in poor and slim demand at 40 to 45? Even metropolitan New York is not so rich and purse-proud that its inhabitants would not like to get $100 for $45—but the hard fact has got to be faced, and speculative New York will only agree that about $45 is what the parchment is worth. Mr. Purdy is right when he says that "this early and extravagant boasting may help to sell patents in other localities."

We wish to return herewith our thanks to Messrs. Smith and Purdy for their full and prompt replies to our queries.

CANDLE POWER OF PHILADELPHIA (PA.) GAS.—Professors Stephens and Rogers submitted reports of the average candle power of the gas supplied by the works under control of the Philadelphia (Pa.) Gas Trust, during the month of July. The former stated that a chemical examination of the average gas for the month showed the absence of impurities formerly sought to be removed. Photometric observations, he said, gave an average of 17.07 candle power. The average reached by Dr. Rogers was 17.10 candle power. For the month of June the latter fixed the average candle power at 17.05.

KNOXVILLE, TENN., WANTS ANOTHER GAS COMPANY.—The right to establish and operate a gas company was recently granted to Messrs. Eugene Fauntleroy, Louis B. McWhirter, and others, the objective point being Knoxville, Tenn. These gentlemen are reported to represent a "Syndicate" that has operated in this direction in other cities. The "engineer" of the party, named Elliot, has visited Knoxville, so it is reported, for the purpose of selecting a site, making estimates, etc. This organization states that it will put between $50,000 and $75,000 into the Gas, Fuel and Power Company (for such is its name) during the next six months, and is going to do the usual thing of supplying a much better light than that formerly supplied by the old company; but, in the words of our informant, "have obligated themselves never to charge more than $2 per 1,000 feet." Mr. McWhirter very considerately announces that, if the people of Knoxville so demanded, himself and associates would allow them (the people) to subscribe for 48 per cent. of the entire stock, amounting to $100,000; but at the same time would perfer that the said associates would put up all the money, and we guess the "people of Knoxville" had better let Mr. McWhirter and the "associates" take the whole of it. If ever the new company gets to work we wonder how long they will "feel obligated to charge $2 per thousand"—much less a lower figure.

DEATH OF JOHN C. TRAUTWINE, C.E.—Mr. John C. Trautwine, C.E., an eminent and widely known engineer, died in Philadelphia, Pa., on Friday, September 14, being in the 54th year of his age. Mr. Trautwine was a gentlemen of great and versatile talent, and it is claimed that he was the originator of the trussed suspension bridge, and the development of railway construction in this country owes much to his genius. As an author Mr. Trautwine will be remembered from his book, entitled the "Engineers Pocket Book," which publication has reached it eighth edition, and of which 20,000 copies are now in circulation. Mr. Trautwine had the misfortune to lose his right arm in the summer of 1854, having had it crushed between two iron coal cars at Port Richmond, Va., but this accident did not put an end to his professional labors, as the numerous occupations in which he has since engaged amply attests. The *Engineering Times* says that his final illness seemed to be simply an aggravated state of exhaustion, induced by the undermining of his health in years past by tropical fevers, by which he had more than once been prostrated during his South American service. His widow and three children survive him.

STILL CHEAPER GAS FOR HARTFORD, CONN.—The Hartford Gas Light Company has made another step in the right direction, and seems bound to furnish illuminating gas as cheap as possible. At a meeting of the board of directors, held Monday, September 17, a vote was passed to reduce the price of gas by 10 cents per 1,000 feet, the reduction to take effect on and after December 1st next. This brings the price down from $1.90 to $1.80 per thousand, and is the kind of music that the company's consumers are pleased to hear. The reduction just announced is but simply carrying out the policy established by the company some while ago—and that policy is to give the public, from time to time, the benefit of the earnings from an increased business, along with the improvements effected in the system of manufacture, and, at the same time, not neglecting the interests of stockholders. There is but one other city, if we remember rightly, in New England, that is at present furnishing gas at less than $1.80 per thousand, and that is the city of Lowell, Mass., which place is particularly well-favored in the possession of a large number of manufactories. The price of gas in Boston, Mass., just corresponds to the future new rate at Hartford. It is less than a year ago that the Hartford company reduced its price from $2 to $1.90 per thousand, and Mr. Harbison has undoubtedly prepared a surprise for his patrons in this latest move, and it is little to be wondered at that the relations existing between the Hartford Gas Company and its patrons are pleasant and harmonious. While on the subject of Mr. Harbison, we regret to say that he was recently thrown from his carriage, on account of the breaking of an axle, and before the horse could be stopped Mr. H. was dragged some distance. Being well posted in the handling of fiery steeds, he held on to the reins, and fortunately escaped without serious injury. Gas men usually can hold their own.

ANOTHER FIRE CAUSED BY AN EDISON WIRE.—A defect is one of the Edison wires supplying the electric current to the premises of Mr. Peter Muller, at No. 88 South street, New York city, caused a slight fire. That the damage occasioned thereby was not of much pecuniary account should not detract from the fact that the Edison system is not so safe as its promoters claim it to be.

"STANDARD" WASHER-SCRUBBERS.—The following companies have recently erected "Standard" Washer-Scrubbers at their works: St. Louis, Mo., one of 2,000,000 cubic feet per diem capacity; Laclede (St. Louis, Mo.) one of 1,000,000; Lowell, Mass., one of 1,000,000; Toledo, Ohio, one of 750,000. The 2,000,000 "Standard," under construction for the Boston Gas Light Company, by the Smith & Sayre Manufacturing Company, will be delivered this month.

THE BOWER-GRIMSTON BURNER.—Mr. A. S. Bower, of St. Neots, England, arrived in New York, on the "City of Richmond," Inman line of steamers, last week. He has brought over several specimens of the Bower-Grimston regenerative gas burner, which will doubtless be thoroughly tested by some of our American and Canadian engineers, and be on exhibition during the coming meeting of the American Gas Light Association.

A DESERVED TRIBUTE.—J. C. Zabriskie, the old Superintendent of the Laclede Gas Works, has just retired from that position, which he has held for the past twelve years. Upon the occasion of his leaving Mr. Zabriskie was given a pleasant surprise when his fellow-workmen called upon him in a body and presented him with a magnificent gold watch. Mr. John Tompkins made the presentation speech, in which he referred to the kindly feeling held by the workmen for their old comrade, and how they desired him to accept of the present as a token of their regard. Mr. Zabriskie replied in a few words, thanking the men not only for the gift but the good will that accompanied it. The watch is appropriately engraved.

SOUTH BEND (IND.) LIKES THE LIGHT.—The South Bend Gas Company placed an excellent specimen of a Bray burner on one of the prominent street corners of the city, and the South Benders were somewhat astonished at the brilliant light afforded thereby. The company proposed to the Council that they cause a number of the Bray burners to be distributed in good locations, and should this be done, South Bend will be well lighted.

Lighting Streets.

Mr. William Thomson, F.R.S., of the Royal Institution, Manchester, in speaking of street lighting, says—

"I have naturally taken notice of the street lighting of Manchester and Salford, and have been struck by the fact that about one-half of the available light produced in the street lamps is uselessly thrown away. The ordinary street lamp used in Manchester and Salford is provided with a crown covered by transparent glass, through which the light, radiated upwards from the burners, passes away into space. If one can imagine streets placed at the same distance above the lamps as our streets are below them, the imaginary street would be just as well lighted as the real ones by the lamps at present in use. The cost of gas used for lighting the streets of Manchester and outskirts amounts, I believe, to about £24,000 per annum. Light to the annual value, therefore, of about £12,000 is actually used for illuminating the imaginary streets and the clouds; and the other half employed for the purpose for which the light is intended. If the outside of the glasses in the crown of the lanterns were painted with white asbestos paint the effect would be magical when the lamps were lit. The streets of Manchester, which now are but indifferently lighted, would appear comparatively brilliantly illuminated; and the cost for producing this result would be defrayed in two or three nights, by the value of the light which it would utilize, and which is at present lost. The vicinity of Trafalgar Square and the Strand, in London, furnishes remarkable material for forming a judgment of what can be done by white surfaces placed in the lanterns above the ordinary burners. There one can find lamps which appear to have been specially adapted for the illumination of the clouds; and, close by, he can see the same consumption of the gas going on in other lanterns with some white material placed above the flame to reflect the top light downwards. Thus he may satisfy himself that the white plates play the part of another burner or other burners in each lamp. Better results than by painting the glasses in the crown may be obtained by placing a sheet of white enameled iron at a short distance above the flame; but this would cost a little more than the painting of the top glasses. It would, however, have the advantage over the painted glass, of reflecting the light only once. In the high crown some of the light would be reflected from one side to the other before leaving the lantern; and each time light is reflected a certain amount is lost by absorption. I believe if simple means be taken to utilize the light which is at present produced in the ordinary street lamps, very satisfactory results will be obtained, and new and expensive lamps will be unnecessary."

The Market for Gas Securities.

The city gas share market for the period under review has experienced a considerable appreciation in values, and every indication points to still stiffer prices. We chronicled last fortnight an advance of 6½ points in Harlem gas, and predicted the likelihood of being called upon to record a further advance. That we "reckoned with our host" is borne out by the simple statement of the present bid price, the same being 110, showing an increase of 3½ per centum—and the end is not yet. Manhattan Gas is steady at 230 to 232; New York gas is stronger, at 127 bid, offered at 130; Mutual gas remains at 116 to 118; Metropolitan is quoted at 187 to 190, and is strongly held at the latter figure, with but little stock offering; Municipal gas furnishes the greatest showing of strength, having jumped from 183 bid, offered at 190, to 190 bid, offered at 195; Equitable gas makes its first appearance on the share list, and is quoted at from 90 to 95; Central gas also joins in the "bull movement," latest quotations being 90 bid, no stock offered.

While the city gas share market presents the above evidence of rising values, the electric light securities appear to be troubled with an alarming attack of "the slows." The "great and only Edison electric light company" parchment was offered on the "street," during the past week, at $187; and, if our memory does not "play us false," this is the lowest price at which this description of "sinking fund" security has ever before been quoted. The stock of the other branch department of the Edison financiers (the Edison Electric Illuminating Company) is offered at from 40 to 45. The shares of the United States electric concern are steadily depreciating in value, and, as it is with the samples quoted, so it is with them all. The "patent right" cow appears to have been pretty well milked, and the accumulator system does not seem as though it had been of much success in distending the hitherto faithful udder.

While the electric lighting concerns on this side of the water exhibit such decidedly distressing financial symptoms, the English electric shares make a much more woeful showing. A reference to our "Item Columns" will show the standing (or, rather reclining) of some stocks that not so long ago were considered gilt-edged. Time has evidently worn off some of the plating.

Brooklyn gas shares are strong and higher, with the possible exception of old Brooklyn, which during the first week of the fortnight experienced a decline, but since has straightened out somewhat; we quote it at 109 to 112; other descriptions of Brooklyn gas securities show an advance. Citizens gas we quote at 77 to 80; bonds of same company at 106 to 110; Fulton Municipal is rated at 90 to 95; Peoples at 55 to 60; Peoples bonds at 105 to 110; Metropolitan, 85 to 90; Nassau, 55 to 60; Nassau certificates 80 to 85; Williamsburgh, 78 bid, no stock offered; bonds of same company 104 to 108.

Out-of-town shares also share in the "boom"—we quote Consolidated gas, Baltimore, Md., at 49 to 50, which is a notable rise. San Francisco shares are stronger, and this statement holds good at most all points from which we receive advices.

Correspondence

[The JOURNAL is not responsible for the opinions expressed by correspondents.]

What One Newspaper Does Not Know About Gas.

BOSTON, September 19, 1883.

To the Editor AMERICAN GAS LIGHT JOURNAL:

When I wrote you, some short while since, concerning, "Eighteen Year Old Journalism," I did not think that the veteran editor of the New York *Journal of Commerce* would so soon join the ranks of those who are guilty of making loose statements in regard to one of the great economic industries of the country. August 21, 1883, an editorial, headed "The Gas Monopoly," appeared in the *Journal of Commerce*, which is a series of misstatements, and shows either a desire to mislead its readers, or an entire ignorance on the part of the writer of the subject on which his article treats. After speaking of the "Robbery of our citizens now practiced by the conspirators which have the franchise for supplying gas here," the writer goes on to say that "gas can be produced and delivered to consumers at 85 cents per 1,000 cubic feet, and pay a handsome profit."

Now, Mr. Editor, you and I both know that the above statement is not true, and that if the writer had investigated the subject he would have hesitated to have written an article, knowing that it was not true; for it is well known that in the vicinity of New York, with materials and wages at present prices, illuminating gas of the quality shown by the official reports to be furnished to consumers (the office of the *Journal of Commerce* included) cannot be made and distributed for the sum named, and that had the editor of the *Journal of Commerce* enquired of any gas engineer engaged in the manufacture of illuminating gas in the immediate vicinity of New York, he would have been so informed. But really, Mr. Editor, I cannot but think that *facts* were not sought for by the writer of the article in the *Journal of Commerce*, but that loose statements were hustled together and given to its readers as facts concerning this great industry and its management.

We are also told that "the gas furnished in Glasgow, at 3s. 6d., is nearly 50 per cent. better than the miserable product given to us at $2.25. Now, see how little this editor knew of what he was writing about, for, during the week ending August, 1883, the official report of the Gas Inspector of the city of New York shows the candle power of the gas furnished to the consumers of that city to have been, on an average, 23.75 candles, and the average candle power of the gas company, from which the office of the *Journal of Commerce* is supplied, for the same week, was 26.58 candles; while this "David come to judgment," in his editorial article, declares that the gas furnished in New York "is extraordinarily good when it comes up to sixteen candles; and averages far below it."

We are also told that "there is no pretence of decency in the charge thus made for gas to our citizens," and, also, that to pay this price "is to suffer a most outrageous wrong for which no language can be too severe." What a burst of indignation this venerable editor indulges in, and all built upon false premises; and what language can be too severe towards a man who could have availed himself of the facts, but rather chose to give his readers a series of misstatements tending to prejudice their minds against those engaged in directing this great industry.

How much reliance should be placed upon the statements of a man, concerning any subject he may choose to write upon, especially when he claims, through his columns, to enlighten the people upon all subjects on which they may ask questions and upon general subjects selected by him for comment in his paper, I leave the public to judge, only hoping that his readers will demand that those who attempt to instruct them should know what they are talking about, and that their minds be free from prejudice, in order that the subjects of which they treat may be fairly and truthfully stated.

If this great and widely-circulated newspaper, which daily answers questions bearing upon subjects in which the business men of the country have a vital interest, and which newspaper has heretofore been supposed to have given *facts*, in answer to these questions, upon the truth of which its readers have depended and acted, is as far out of the way in these statements as it is in regard to what its Editor states concerning the quality of the illuminating gas furnished it, the price at which the same can be supplied, and the profit that can be made by the companies furnishing it, then its readers are indeed depending upon a broken reed, and the public who read that journal should know it.

NAMSAG.

Gas Stocks.

Quotations by Geo. W. Close, Broker and Dealer in Gas Stocks (with W. B. Scott & co.)

34 Pine Street, New York City.

October 2, 1883.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share. ☜

	Capital.	Par.	Bid	Asked
Central	$466,000	50	90	—
Equitable	2,000,000	100	90	95
Harlem	1,800,000	50	110	112
" Bonds	170,000		—	—
Manhattan	4,000,000	50	228	232
Metropolitan	2,500,000	100	187	190
" Bonds	658,000	—	105	110
Mutual	3,500,000	100	116	118
" Bonds	1,500,000	1000	104	106
Municipal	3,000,000	100	190	195
" Bonds	750,000		106	110
New York	4,000,000	100	127	130
Northern	125,000	50	—	95
" Scrip	108,000			
Gas Co's of Brooklyn.				
Brooklyn	2,000,000	25	109	112
Citizens	1,200,000	20	77	80
" S. F. Bonds	320,000	1000	106	110
Fulton Municipal	1,500,000	100	90	95
" Bonds	300,000		103	106
Peoples	1,000,000	10	55	60
" Bonds	290,000	—	105	110
" "	250,000	—	90	95
Metropolitan	1,000,000	100	85	90
Nassau	1,000,000	25	55	60
" Ctfs	700,000	1000	80	85
Williamsburgh	1,000,000	50	78	—
" Bonds	1,000,000	—	104	108
Richmond Co., S. I.	300,000	50	—	75
" Bonds	40,000	—	—	—
Out of Town Gas Companies.				
Buffalo Mutual, N. Y.	750,000	100	80	85
" Bonds	200,000	1000	95	100
Citizens, Newark	918,000	50	80	85
" " Bonds.	124,000	—	105	10

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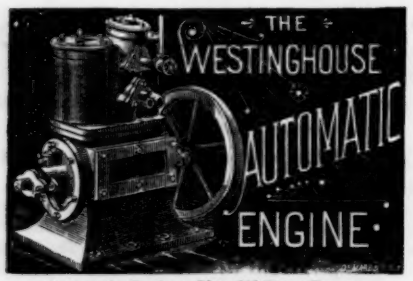

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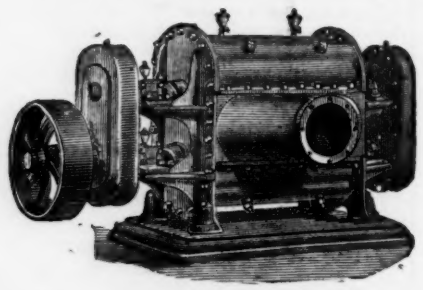

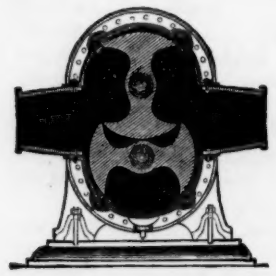

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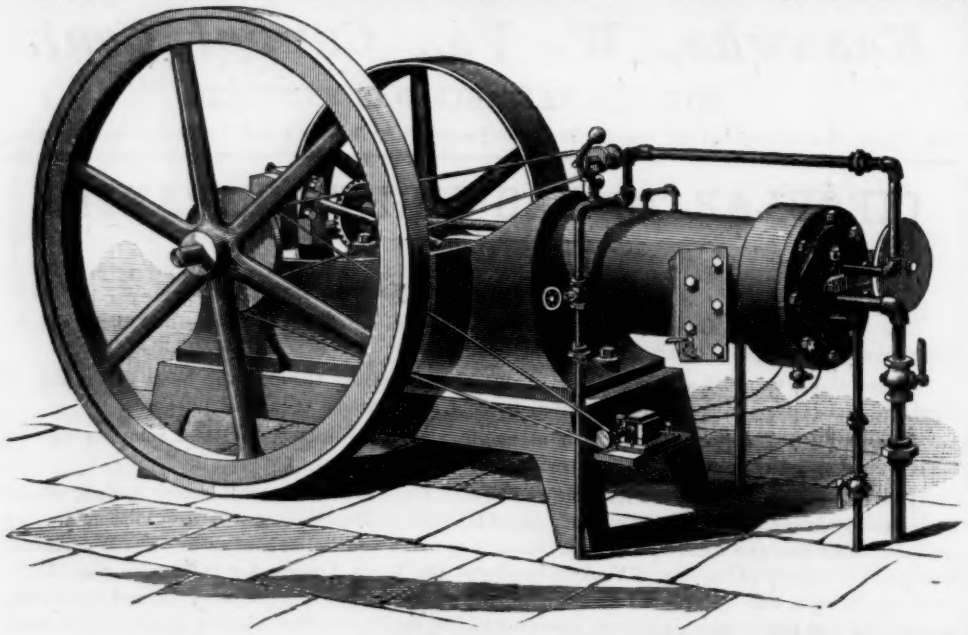

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